Homework 13: User Manual
Due: Friday, April 18, at NOON

Team Code Name: _Team KANG / Sentinel Mark I_____   **Group No.** __1__

NOTE: This is one of the last sections needed to finish the Final Report. This homework will count for 4% of each team member's grade, and therefore all team members should participate equally in completing it. The User Manual should be about 5 pages in length (one page per bullet).

User Manual Outline:
- **Brief (marketing-style) product description**
- **Product illustration annotated with callouts for each control/display**
- **Product setup instructions**
- **Product use instructions**
- **Product troubleshooting instructions**

Evaluation:

SCORE	DESCRIPTION
10	***Excellent*** *– among the best papers submitted for this assignment. Very few corrections needed for version submitted in Final Report.*
9	***Very good*** *– all requirements aptly met. Minor additions/corrections needed for version submitted in Final Report.*
8	***Good*** *– all requirements considered and addressed. Several noteworthy additions/corrections needed for version submitted in Final Report.*
7	***Average*** *– all requirements basically met, but some revisions in content should be made for the version submitted in the Final Report.*
6	***Marginal*** *– all requirements met at a nominal level. Significant revisions in content should be made for the version submitted in the Final Report.*
*	***Below the passing threshold*** *– major revisions required to meet report requirements at a nominal level.* ***Revise and resubmit.***

** Resubmissions are due within **one week** of the date of return, and will be awarded a score of "6" provided all report requirements have been met at a nominal level.*

Include this sheet as a cover page for your report

Table of Contents

Introduction

        Congratulations on your purchase of the Sentinel Mark I autonomous area defense system. This is a lightweight, sturdy robotic turret capable of independently sensing, acquiring and neutralizing threats in its vicinity. A safety feature is built-in to allow friendly personnel in the area to disable autonomous targeting to eliminate the risk of bodily harm. Simply follow a few simple instructions, and then leave it in an area that you wish to secure. You may also choose to manually control this turret to allow for custom control of the targeting and firing systems with the ability to remain in the safety of a panic room or security office.

Features

- Two modes of operational control: manual and autonomous
- Simple calibration
- Latitudinal and longitudinal motion of weapon turret
- Ancillary sensors to detect motion outside of the camera's field of view
- Easy user interface for manual control
- Friendly fire prevention system
- May be powered from a standard wall outlet

Example Applications

Military Base Defense

        Set the turret up at a vulnerable point in your compound to help sentries with their duties and heighten security. It may be integrated into the security system to allow for manual override by personnel in a war room, security office or fortified behind barricades.

Paintball/Airsoft Gaming

        Use the turret in automatic mode or manual mode for an added degree of competition, difficulty and diversity in paintball or Airsoft competitions.
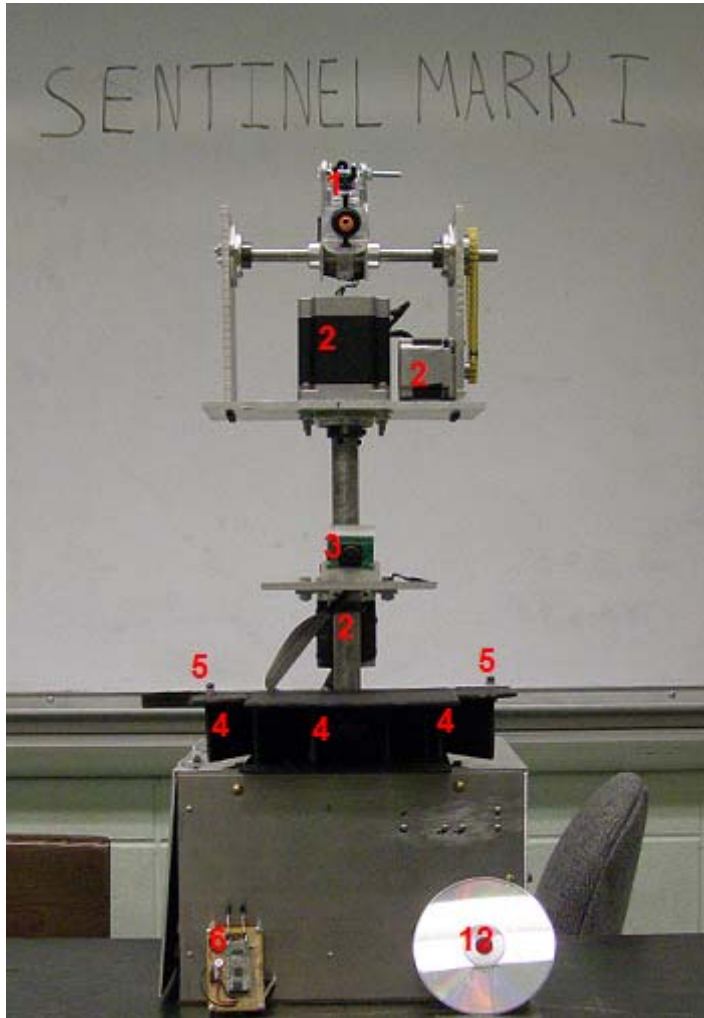
Packaging Contents

Figure 1. Front view of Sentinel Mark I

Figure 2. Base of Sentinel Mark I

Figure 3. Side view of Base

Please be sure to check if your package includes the following:

1. 1 Airsoft Gun
2. 3 Motors (Pan and tilt for airsoft gun and pan for camera)
3. 1 CMOS Camera
4. 3 Motion Sensors
5. 2 IR Receivers
6. 1 IR Remote (with standard 9V battery)
7. 1 Printed Circuit Board
8. 1 PC Power Supply
9. 3 Drivers for the Motors
10. 1 Circuit Board for IR receivers
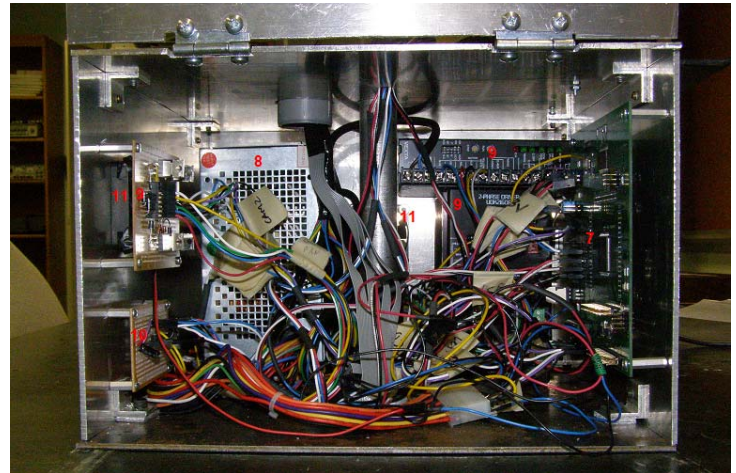11. 2 Fans
12. 1 User Graphical Interface CD
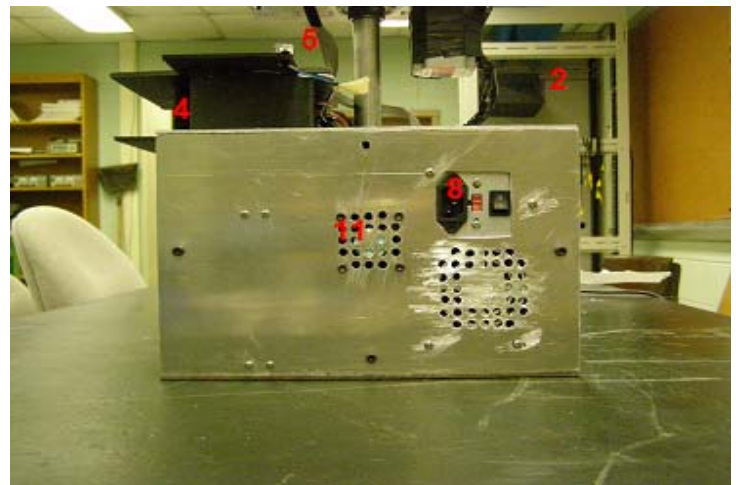
Quick Start Guide (5 EASY STEPS!)

1. Install the User Interface Software CD

2. Insert an AC power cable to the back of the base of Sentinel Mark 1 and into the Wall.

3. Flip the switch onto the on position indicated as "|" on the switch

4. Plug in User Interface Adapter as labeled (located in the base of the packaging) to your PC or Laptop

5. You now have control over Sentry Mark I and can provide commands to it as indicated in the User Interface instructions.

User Interface Instructions

NOTE: You must have a MATLAB V7 V7.1 or later installed on your computer to operate the user interface provided in the CD.
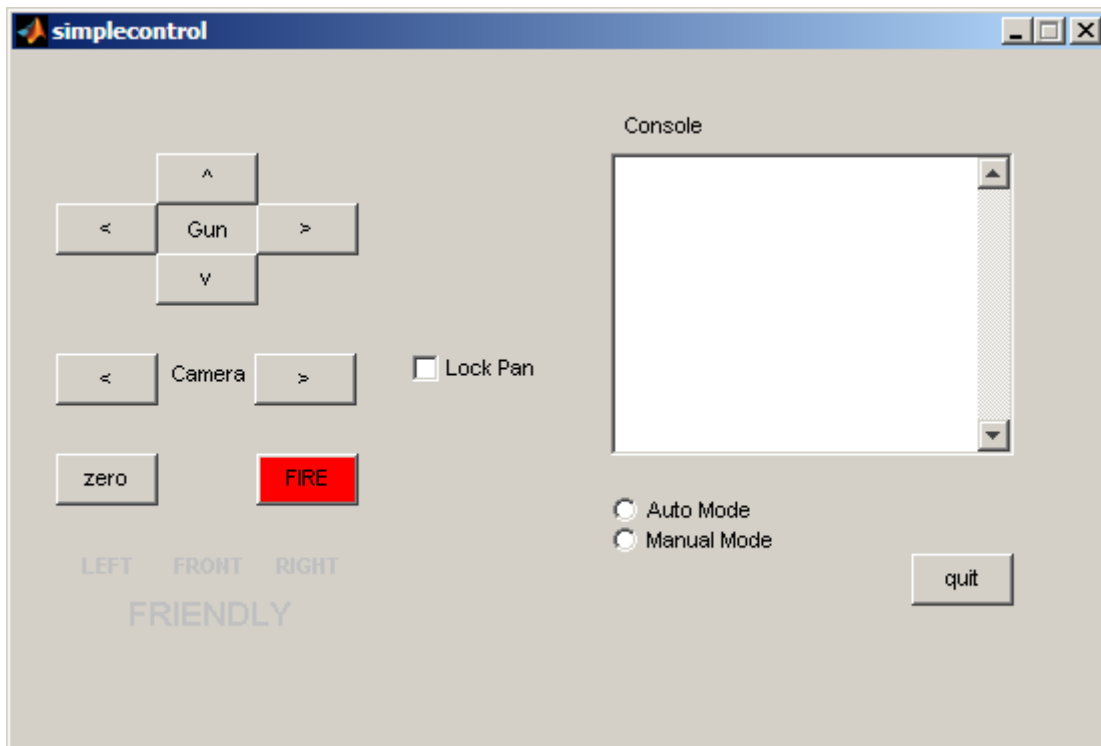

Figure 3. User Interface GUI

As you can see above is an image of the user interface, there are two operating modes:

- Manual Mode Controls
  - "Zero" button (You MUST ALWAYS provide a zero position at START UP - center both pan platforms and the tilt platform, and then press the zero button)
  - "Lock pan" check box locks the gun and camera pan together so that the user can view what the gun is seeing at all times

- o   Control the pan/tilt of the gun with the arrows around the word "Gun"

- o   Control the pan of the camera with the arrows around the word "Camera"

- o   FIRE button is for the ability to fire the gun on command

- Automatic Mode Controls

  - o   LEFT, FRONT, and RIGHT will light up red accordingly should a motion sensor be tripped in that location (Enemy Detection)

  - o   If motion sensor is tripped the camera will move in that field of view and a video algorithm will track an enemy and shoot autonomously

  - o   FRIENDLY will light up red should a friend be detected with the IR Receiver/Transmitter system and also physically the gun will move to its zero position and the gun will tilt down.

  - o   To leave auto-mode just click on the on manual mode

The Console will display text messages providing useful data and other information for the user while they are operating the device.

Troubleshooting

Problem: Nothing is powering up.

Solution: Check to see if the base of the package is connected to the wall. Once that is done, when you flip the on switch, the fan on the power supply should be running.

Problem: The motors are not moving to the correct location.

Solution: First check if any of the cables are loose onto the printed circuit board for the motors. Second, tighten all the screws on the motor and check the drive chains to see if nothing is loose. Then, Power down the system and repower it. Be sure to ZERO the motors in manual mode directly after powering it on with the user interface. If this doesn't fix it, look at the motor drivers and calibrate the dials on them according to your liking.

Problem: Friendly detection is not working (auto-mode).

Solution: First check if your IR remote's batteries are dead.   Then check if there are any loose connections on the printed circuit board or the IR sensors themselves.

Problem: Enemy detection is not working (auto-mode).

Solution: Check if there are any loose cables on the printed circuit board and on the motion sensors.

Problem: Gun is not firing.

Solution: Check if the cabling for the gun on the printed circuit board is loose.

Problem: Commands done on the user interface are not being executed with Sentinel Mark I.

Solution: Check your COM port settings; make sure that you're communicating with Sentinel Mark I at 1152 kBaud.

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Disclaimer

This is a potentially dangerous product that can cause personal injury including, but not limited to, serious wounding, paralysis and death. Do not use this product in an area where someone may be harmed. Do not use this product around children or in areas with innocent bystanders or civilians. The implementation of anti-personnel weaponry on this device is intended to be used ONLY by military or police. All recreational shooting sport applications of this product should be used with approved, non-lethal weapons, by responsible adults. KANG assumes no responsibility for injury or death caused by misuse of this product.